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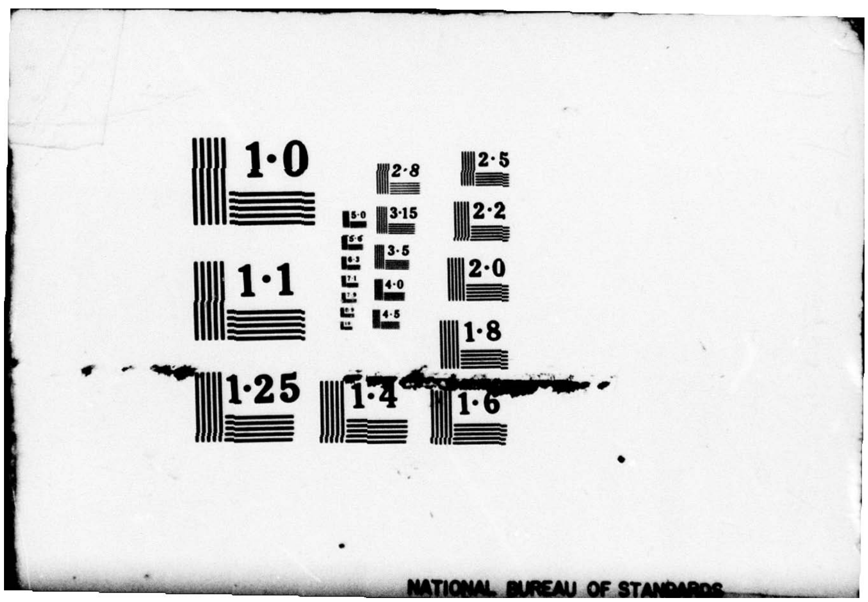
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AN ANALYSIS OF SIMULATED USAF
FACILITY CONTINGENCY REQUIREMENTS
IN THE NATO THEATRE

Timothy N. Beally, Captain, USAF
Russell L. Gilbert, Captain, USAF

LSSR 8-78B

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LOGISTICAL SYSTEMS FOR CONTINGENCY CONSTRUCTION
BASE DEVELOPMENT PLAN FOR FACILITY SUPPORT

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In contingency situations of short duration (180 days or less), USAF facility requrements for operations are normally met with organic resources and Bare Base provisioning. When conflicts escalate into sustained operations (greater than 180 days), USAF must satisfy its facility requirements through other channels. Two sources of support are the Army Functional Component System (AFCS) and the Navy Advanced Base Functional Component System (ABFCS). Use of either the AFCS or the ABFCS requires USAF to identify required facility support. Identification is accomplished via a base development plan. This research uses a simulated base development plan for a NATO base to evaluate the capability of the AFCS and ABFCS to satisfy USAF facility requirements. The assets of both systems are manually searched for facility support. Since the Army has primary construction support for USAF requirements overseas per DOD Directive 1315.6, the AFCS is further researched through a simulated requisition for logistical information of facility delivery to a NATO base. Analysis of the ABFCS and AFCS organization, the search process, and the simulated requisition exercise are discussed with emphasis on the capability of the AFCS and ABFCS to support USAF facility requirements.

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AN ANALYSIS OF SIMULATED USAF FACILITY CONTINGENCY REQUIREMENTS IN THE NATO THEATRE

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Facilities Management

By

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September 1978

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This thesis, written by

Captain Timothy N. Beally

and

Captain Russell L. Gilbert

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN FACILITIES MANAGEMENT

DATE: 8 September 1978

Ronald E Kupfer

COMMITTEE CHAIRMAN

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GLOSSARY OF ACRONYMS

ABFCS	Advanced Base Functional Component System
AFCEC/DOS	Air Force Civil Engineering Center, Directorate of Readiness
AFCS	Army Functional Component System
AFM	Air Force Manual
AMC	Army Material Command
AR	Army Regulation
BDP	Base Development Plan
CERL	Construction Engineering Research Laboratory
CNM	Chief of Naval Material
CNO	Chief of Naval Operations
COB	Co-located Operating Base
CONUS	Continental United States
DMZ	Demilitarized Zone
DOD	Department of Defense
EFCS	Engineer Functional Component System
FAD	Force Activity Designator
JCS	Joint Chiefs of Staff
LB	Limited Base
MOB	Main Operating Base
NATO	North Atlantic Treaty Organization
NAVFAC	Naval Facilities Engineering Command

NSN	National Stock Number
OPLANS	Operational Plans
OPNAV	United States Navy Manual
PD	Priority Designator
PLT	Procurement Lead Time
SB	Standby Base
TM	Technical Manual
TO	Theatre of Operations
TRASCOM	Troop Support and Aviation Material Readiness Command
UMMIPS	Uniform Material Movement and Issue Priority System
UND	Urgency of Need
USA	United States Army
USAF	United States Air Force
USN	United States Navy

CHAPTER I

PROBLEM FOR RESEARCH

Overview

To support and accomplish military objectives not only requires war equipment and manpower, but also engineering support. Engineering support may be classified into two types. The first type, engineering planning, deals with estimating facility requirements to support a particular mission at a given location and developing some plan to provide the required materials in a timely fashion. The second type of engineering support is the actual field erection of the facilities required to execute the mission. The adequacy of facilities at contingent locations is prerequisite to successful operations under situations of armed conflict (18:2).

In contingency situations of short duration (180 days or less), Air Force facility requirements for operations are normally met through the utilization of existing facilities and organic field equipment and field construction (15:130). However, in instances where existing facility and organic capabilities are lacking, immediate requirements are provided under the Air Force Bare Base concept. This concept provides air mobile equipment and

temporary facilities to support deploying aircraft in austere environments[1] (1:8). To implement the Bare Base concept the Air Force developed mobile and containerized support packages such as Harvest Eagle and Harvest Bare. Past experiences in Vietnam are testaments that the Bare Base concept generally provided sufficient initial temporary facility[2] support to forces during initial deployment to austere environments.

However, should the contingency situation escalate into sustained operations (greater than 180 days), Air Force requirements mandate more permanent facilities[3] than those provided for under the Bare Base concept. Air Force requirements are identified in Base Development Plans (BDP) which are engineering assessments of the improvements or expansion of facilities at a location to support military operations (18:2). The BDPs are instrumental in estimating the facility support required for Air Force operations in sustained contingency operations. The facility support requirements are then translated into the various items that are required to build the required facility. As various missions are identified for each base, the aggregation of

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[1] Austere environments are interpreted as an operational site lacking existing facilities.

[2] An example of a temporary facility is a tent.

[3] Permanent facilities are broadly defined to be durable, weather resistant structures having a life span beyond one year.

all BDP create aggregate facility requirements. These aggregate facility requirements are then broken down into the items required for construction. The items are identified with National Stock Numbers (NSN) and a source of supply. This process as a whole represents an elementary facility component system which is basically a military construction support system for use in the theatre of operations (12:1). This system is illustrated in Figure 1-1.

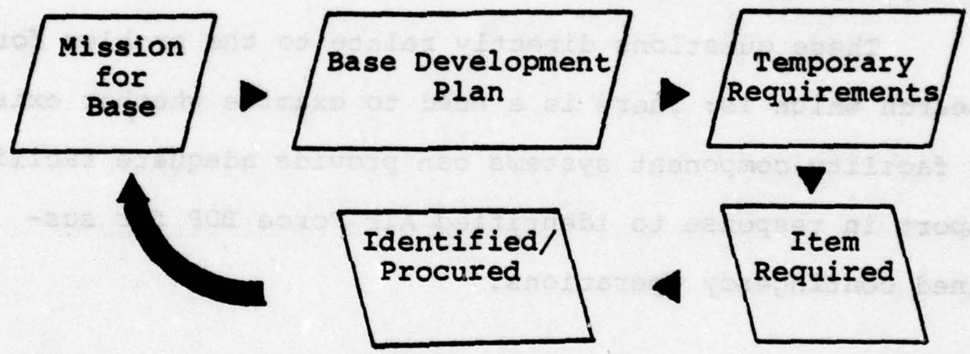

Fig. 1-1. Development of a Facility Component System

Statement of the Problem

Since each service (Army, Navy and Air Force) has different missions, different facility component systems exist to implement the associated BDP. However, the Air Force only recently began development of their own organic facility component system. Since the Air Force's facility component system is still in an embryonic state of development the Air Force must rely upon the existing Army or Navy

facility component systems to satisfy its requirements generated by the various BDPs. Reliance on existing facility component systems generate several questions. First, are the Air Force's BDPs adequate to identify facility support requirements? Secondly, do the Army and Navy existing facility component systems provide acceptable Air Force facility support requirements associated with particular BDPs? Third, are the existing facility component systems responsive to the time demands imposed by sustained contingency operations?

These questions directly relate to the problem for research which is: There is a need to examine whether existing facility component systems can provide adequate facility support in response to identified Air Force BDP for sustained contingency operations.

A Case in Point

On August 18, 1976 North Korean guards ". . . savagedly axed to death two U.S. Army officers as they escorted a South Korean work party pruning a poplar tree . . . [21:50]" inside the demilitarized zone (DMZ). The attack by the North Korean was unprovoked and nearly strained the existing tense political situation to a state of war (21:50,51).

As a result of this confrontation, all bases within the Republic of Korea (South Korea) were augmented by other

squadrons as various operational plans (OPLANS) were implemented. Operational bases such as Kunsan and Osan were taxed to provide adequate augmented support facilities such as aircraft parking aprons, reveted parking slots, and support billeting. Kunsan and Osan's difficulties of providing support facilities, however, could not compare to the difficulties encountered at Taegu Air Base. Taegu changed from caretaker status to fully operational in 31.5 hours after the murder incident (8:26). (Whether or not this 31.5 hours of time represents adequate deployment strength is irrelevant for this research, but it is cited as an example of the rapid change in status that is possible during contingencies.) Taegu was short of many support facilities, including water supplies for the deployed squadrons.

Had this confrontation mushroomed into a sustained conflict, the lack of adequate facilities to support the mission requirements of the deployed squadrons may have precluded successful air operations.

Justification

Although armed conflicts involving the United States could erupt almost anywhere in the world, the four most probable areas of conflict are currently South Korea, the Eastern Mediterranean, the Persian Gulf and Western Europe (20:24). The greatest potential for a sustained

conflict is generally believed to be Western Europe involving the forces of the North Atlantic Treaty Organization (NATO). According to Secretary of Defense Harold Brown,

> Conflict in one of these areas [South Korea, Eastern Mediterranean, and the Persian Gulf] not only might require the dispatch of some appropriate U.S. forces to the scene in support of friends and allies; such contingencies could very well proceed and even set off a crisis or conflagration in Europe [20:24].

The concern over the increasing NATO threat has led President Carter to promise increases in American troops to strengthen the NATO defense posture. One of President Carter's specific promises is

> . . . a plan to expand America's quick-reinforcement capabilities substantially over the next five years. At present, only about one division and 40 squadrons of tactical aircraft could be rushed to Europe within 10 days to augment the 5 2/3 American Army divisions and 28 air squadrons stationed there. By 1983, the plan is to be able to add five divisions and 60 tactical air squadrons to American forces on the NATO front within 10 days [3:35].

Furthermore, the NATO threat is shifting the U.S. military posture to a "one and one half war" posture that will concentrate the bulk of U.S. armed strength to deterring or, if required, to fighting a major war in Europe (20:25).

The growing concern over the NATO threat demands a detailed examination of contingency planning and operations from an engineering viewpoint. The Air Force Civil Engineering Center's Directorate of Readiness (AFCEC/DOS) has been tasked by Headquarters USAF with this examination. AFCEC/DOS questions whether the existing facility component

systems can adequately support the NATO threat. According to AFCEC/DOS, should an armed conflict erupt in the NATO theatre, the existing facility component systems available for sustained contingency operations would be inadequate to support the deployment of Air Force weapons systems (2). This research will complement AFCEC/DOS's examination of facility support for the NATO theatre.

Background

One of the lessons learned from logistic and operational planning in World War II was that logistic and operational planners required a simple and flexible means to plan and establish operational bases in the theatre of operations. This requirement resulted in the development of a facility component system by the U.S. Navy in World War II that was named the Advanced Base Functional Component System (ABFCS). The concept of the ABFCS was to utilize pre-engineered and pre-selected material to provide facility requirements in constructing advanced bases. The ABFCS was designed to provide fundamental material and equipment requirements from pre-positioned war reserve stocks, the Navy stock system and outside procurement to establish advanced bases and to expand existing bases. These materials and equipment were identified and catalogued to produce a comprehensive listing of facility components and manpower requirements to construct, operate and maintain many types of advanced bases (16).

The U.S. Army experiences from World War II and the Korean War also led to the development of a facility component system that was named the Engineer Functional Component System (EFCS). The EFCS was developed in the 1950s and consisted of standard facility designs. The Vietnam War poignantly reflected the need for a facility component system that incorporated pre-engineered, prefabricated, relocatable facilities as a means of improving construction responsiveness and reducing construction efforts (2; 13). This need led to the re-evaluation of the EFCS and, subsequently, to the development of the present Army Functional Component System (AFCS).

The services facility components are: ". . . military construction support systems for commanders and planners to use in selecting facilities for use in the theatre of operations [12:1]." The facility component systems represent

> . . . the quantitative expression and measurement of planning, procurement, assembly, and shipping of material and personnel needed to satisfy emergency facility support requirements overseas [17:v].

Each of the existing facility component systems is tailored to meet the anticipated facility requirements of their respective services. Each system is basically comprised of planning guidance, designs, bills of material, and logistic data that describes pre-engineered facilities commonly required by military forces for base development

in the theatre of operations. The only substantial difference between the ABFCS and the AFCS is that the AFCS utilizes an automated data base to maintain and update information on a more frequent basis.

Delegation of Responsibility for Air Force Construction Support Overseas

As early as 1957, the Army was directed to provide military troop construction support for the Air Force overseas by DOD Directive 1315.6. Under this directive, the Army is responsible for:

1. Organizing, planning, training, equipping, maintaining, directing and controlling all units and personnel including those of reserve components required to provide this support.
2. Budgeting and funding for the required units [14].

This policy was reaffirmed in 1969 with the publication of JCS Pub 3. Additionally, this publication prescribed specific responsibilities to the Army and Navy for overseas military construction. The following excerpts delineate some of the specific responsibilities of these services in the performance of overseas construction in support of the Air Force. The Army has the following responsibilities:

> 060404a(3) Military troop construction support of the Air Force in overseas areas, including organizing, manning, financing, equipping, maintaining, directing, controlling, and budgeting and funding for all Army units and personnel, including those of the Reserve components required to provide this support.

060404a(6) Operation of the supply and distribution systems required for the military construction program of the Army.

060404a(10) Performance of the necessary coordination to implement construction support of the Air Force by the Navy as described in subparagraphs 060404 b(3) and (5) below [15:180].

The Navy has the following responsibilities:

060404b(3) Military troop construction support of the Air Force in overseas areas, exceeding the capability of the Army for the support furnished in subparagraph 060404a(3) above, as assigned.

060404b(5) Operation of the supply and distribution systems required for the military troop construction support portion of the Air Force military construction program in oversea areas, exceeding the capability of the Army for the support furnished in subparagraph 060404a(6) above, as assigned [15:181].

As DOD Directive 1315.6 is currently under revision, these prescribed responsibilities of the Army and Navy may alter somewhat. This revision may increase the responsibilities of Air Force Civil Engineering to provide for war damage repair and initial beddown requirements for the Air Force units (2).

Scope

This research will concentrate on an investigation of the existing facility component systems, the ABFCS and the AFCS, to determine whether these existing facility component systems are adequate to meet the Air Force facility requirements in the NATO theatre. The only facility requirements examined will be those generated from a typical BDP for a NATO base. To keep this research

unclassified, the NATO base will be fictitious as will the BDP. However, the BDP examined will be typical of an actual BDP for the NATO theatre (2). Since the Army has the primary responsibility for Air Force military construction overseas, the AFCS will be examined in greater detail than the ABFCS. Specifically, this research will examine AFCS and ABFCS facility components. It will also address the time required to move those required facility components through the Army distribution system to the point of need. The distribution aspects of the Navy ABFCS will be excluded to limit the scope of this research. This is justified as JCS Pub 3 assigns the Army the responsibility of "the necessary coordination to implement construction support of the Air Force by the Navy. . . [15:180]." Furthermore, the cost of construction support in terms of materials, time and method of erection, will not be researched.

Objectives

1. The primary objective of this study is to formulate a valid methodology to identify and compare Air Force facilities component requirements to the AFCS and ABFCS.

The secondary objectives are to:

2. Analyze the acceptability of the existing facility component systems to the Air Force facility requirements for a contingency operation in the NATO theatre.

3. Identify Air Force facility requirements that are not included in or are not acceptable with the existing facility component systems.

4. Determine the length of time it could take for delivery of required facilities to an air base in an European location.

Research Questions

Questions to be answered by the Research project are:

1. Will the methodology used by this research provide a satisfactory approach to determine if specific Air Force facility requirements can be satisfied by the AFCS and ABFCS?

2. Can the Air Force facility requirements be satisfied by the existing facility component systems?

3. How much time will it take for facilities to be delivered to an Air Force base in Europe?

Definition of Terms

The following definitions will apply for this research:

Base development plan (BDP)--a detailed engineering assessment of the improvements or expansion of the facilities at an installation to support military operations (18:2).

Acceptable facility--provides minimum acceptable requirements within an engineering structure to permit job accomplishment. Minimum acceptable requirements refer to the design of the engineering structure with respect to physical characteristics such as climatic requirements, spatial requirements, capacity requirements, etc. For example, if the Air Force required a 10,000-gallon water tank in a temperate climatic region, any water tank available for use in excess of 10,000 gallons designed for a temperate climatic region will satisfy the requirement.

Climatic requirements--designing engineering structures to withstand temperature differentials associated in a particular climatic region. Climatic regions are defined as follows:

Temperate--mean annual temperature (T)
$30° \leq T \leq 70°$ F
Tropical--mean annual temperature (T)
$> 70°$ F and relative humidity $> 50\%$
Artic (frigid)--mean annual temperature (T)
$\leq 30°$F
Desert--mean annual temperature (T)
$> 70°$ F and relative humidity $< 50\%$ (19:7)

Construction standards--construction materials and effort are expended to construct an engineering structure to meet a specific purpose within a designated life span. Construction standards are:

Initial--life span of less than 6 months
Intermediate--life span of 6 to 24 months
Temporary--life span of 24 to 60 months (15:137)

Contingency operations--military operations in a hostile environment or any armed conflict short of nuclear war (18:2).

DOD category codes--a three-digit numerical coding scheme used by the Department of Defense (DOD) to identify classes of facilities according to purpose. The DOD category codes are:

100 Operation and Training
200 Maintenance and Reduction
300 Research, Development and Evaluation
400 Supply
500 Hospital and Medical
600 Administrative
700 Housing and Community Support
800 Utilities and Ground Improvement
900 Real Estate (19:2,3)

Facility component--all the items which in the aggregate comprise a facility. Examples are utility systems, electrical lighting, concrete blocks, etc.

Facility component system--a detailed listing of planning guidance, designs, bills of materials and logistic data that describes pre-engineered facilities that are required for base development (12:1).

Facility support for mission requirements--those facilities that are required for aircraft to perform their mission; e.g., a runway.

Theatre of operations--a geographical area outside the Continental United States (CONUS) for which a commander of a unified and specified command has been assigned military responsibility (18:3).

Unit of measure--a quantifiable, descriptive unit for specifying facility capacity. For example, when quantifying a building's capacity the unit of measure is square feet. For this research, unit of measures are defined as follows:

SY--square yards
SF--square feet
LF--lineal feet
BL--barrels (55 gallons per barrel)
KW--kilowatts (1000 watts)
KG--kilogallons (1000 gallons)
GS--gallons

CHAPTER II

DATA ORGANIZATION AND SOFTWARE PRODUCTS OF THE AFCS AND ABFCS

Recall from Chapter I that a facility component system is a military construction support system for commanders and planners to use in selecting facilities for use in a theatre of operations. The elements within the facility component system are predicated upon the aggregated common facilities necessary to implement different BDP. Chapter I further stipulated that because of missions unique to each service, different facility component systems evolved to provide service unique logistical support towards implementing a BDP. Thus, peculiarities in nomenclature and data organization exist between the existing facility component systems to satisfy support requirements for each service. For the Air Force to become a "user" of the Army or Navy facility component systems, it is imperative to understand the data organization and software products of the AFCS and ABFCS.

The AFCS

The stated purpose of the AFCS is ". . . to provide a tool to assist all military planners, supply agencies, and construction personnel that have a role in Army

construction . . ." in the theatre of operations (4:32). This purpose is achieved through the implementation of Army Regulation (AR) 415-16, Army Facilities Components Systems. AR 415-16 is the regulatory basis for the development and maintenance of the AFCS (4:17).

AR 415-16 tasks the Army Chief of Engineers with the responsibility for managing the AFCS. This responsibility is delegated by various operating manuals to the Facilities Engineering Directorate, who functions as the Army staff agent, and to the Field Engineering Division, who functions as the action agent. As a staff agent, the Directorate of Facilities Engineering assists the Chief of Engineers in executing his responsibility for the development of plans and programs for facilities engineering. additional staff functions include the planning and execution of Army BDP through the establishment and dissemination of technical policies, criteria and procedures to the various major commands within the Army. As an action agent, the Field Engineering Division develops and manages the AFCS and participates in the research and development of new AFCS items to support base development functions (6:17,18).

Data Organization

Data within the AFCS is structured in a "building block" concept. The AFCS groups items into facilities and

facilities into installations. By the Army nomenclature, an item is defined as the most elementary entity of construction material or equipment which has a National Stock Number (NSN), and is combinable into a larger product. The Army defines a facility as a group of items designed to provide a service, to combine into a larger component part, or to comprise an entity in itself. Similarly, an installation is a group of facilities designed to provide a specific service or to support military operations in the theatre of operations. Figure 2-1 illustrates the hierarchial levels of the AFCS "building block" concept (4:13).

Items are identified within the AFCS by a NSN. For example, an item with NSN 5610-00-250-4676 is a ninety-four-pound bag of cement. Facilities are identified by either a seven-character alphanumeric code or by a six-digit numeric code. Most of the major facilities utilize the six-digit code. The first three digits reflect standard DOD category codes. The next three digits are the Army facility category codes furnished in AR 415-28, Army Facility Classes and Construction Category Codes. For example, facility 811-616 is an electrical generating plant, 60' x 60' x 20' steel frame building, complete with two 500 kilowatt generating units. Installations are identified by a six-character alphanumeric number. For example, installation NT1411 is a 250-man troop camp for the temperate climate. Suffice it to say that this installation

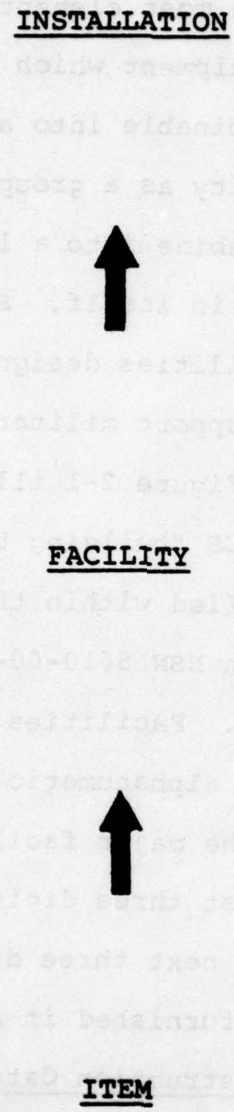

Fig. 2-1. Hierarchial Levels of the AFCS's "Building Block" Concept

code, whatever its original purpose, now functions only as a sequencing code (12:1; 4:73).

AFCS Software Products

The AFCS produces three major outputs that are available for system users. These three outputs are: TM5-301, Army Facilities Components System Planning Tables of Installations; TM5-302, Army Facilities Components System--Designs; and TM5-303, Army Facilities Components System--Logistics Data and Bills of Materials.

TM5-301 provides planning guidance through summary listings of installations and groupings of facilities that comprise each installation. This information is designed for use in developing BDP and preparing base development projects for budgeting purposes. This manual is organized to allow the military planner to select facilities for different construction standards (initial, intermediate, or temporary) and different climatic requirements (temperate, tropical, desert or frigid). The data contained within this manual is catalogued by both installation and facility codes to speed up the selection process (4:18,19; 12:2,3).

TM5-302 provides typical structural and construction drawings. This manual is primarily useful to site planners, AFCS designers and construction units. However, much of the information contained within this manual is useful to military planners (4:19).

TM5-303 provides a detailed listing of construction materials required for each facility contained in the AFCS. It provides a complete listing of the Bill of Materials of items required for each for each facility by NSN. This manual is primarily useful to military planners and logisticians (4:19).

The AFCS utilizes an automatic data base to facilitate control and updating of the master listings of all installations, facilities, bill of materials and other logistic data. The current file lists 274 installations, 3200 facilities and 4000 stock numbered items (13:4).

The ABFCS

Like the AFCS, the ABFCS exists to provide data on facilities and grouping of facilities to planners, constructors, and maintainers of bases in the theatre of operations, and to provide supply procedures for ready reordering and receiving construction materials needed by these bases to implement a BDP. This purpose is achieved through the implementation of Navy regulation OPNAV 41P3, Table of Advanced Base Functional Components. OPNAV 41P3 is the basic reference that describes the ABFCS and assigns responsibility for the maintenance and use of the ABFCS (4:70; 17:1).

OPNAV 41P3 tasks the Chief of Naval Material (CNM) with the responsibility of the engineering management,

direction, and control of the ABFCS to insure the following:

1. Proper interfacing among all ABFCSs are related to design engineering and performance.
2. All ABFCSs include the latest state-of-the-art capability.
3. The concepts of mobility, self-containership and retrievability are considered in the development/updating of ABFCSs.
4. Each ABFCS is assigned to a Bureau or Systems Command that is technically responsible for and therefore assures the mission capability of the particular component.
5. Constant liaison among everyone concerned for the effective utilization of all resources available in order to fulfill any requirements for AFBCSs [7:vi].

To accomplish these objectives, each ABFCS is assigned a "Dominant Command" that exercises responsibility for: reviewing the design and composition of the ABFCS to ensure that mission requirements are met; reviewing equipment assigned to them to insure the latest technological developments; coordinating new component designs and changes with the Naval Facilities Engineering Command (NAVFAC); and recommending to the Chief of Naval Operations (CNO) via the CNM, the inclusion of new components, deletion of old components and the revision of mission statements of existing components. The CNO exercises final approval authority over all ABFCS matters (17:vi).

Data Organization

The ABFCS also utilizes a "building block" concept to define and organize facility data into hierarchial levels. The ABFCS groups items into assemblies, assemblies into

facilities and facilities into components. Generally, comparisons between Army and Navy nomenclature are valid for the same hierarchial levels. For example, the Army's definition of "installation" is a workable definition for the Navy's "component." Facilities and items also convey the same definitional basis between the two systems. Figure 2-2 illustrates the hierarchial levels within the ABFCS and the relationship between the hierarchial levels of the ABFCS and the AFCS.

Items within the ABFCS are identified by a NSN. Item NSN-5610-00-250-4676 still identifies a ninety-four-pound bag of cement just as it did in the AFCS. Assemblies are identified by a five-digit numeric code; e.g., 40000. Essentially, this number functions only as a sequencing number. In this particular instance assembly 40000 identifies a 960-square feet steel building. Facilities are identified by a six- or seven-digit alphanumeric code. The first three digits correspond to standard DOD category codes. The next three or four alphanumeric characters represent the Navy facility category codes defined by NAVFAC P-72, Real Property Navy, Category Codes, and also functions as a sequencing code. For example, facility 811-10P identifies an electrical power plant, diesel, with two 500-kilowatt generating units. Components are identified by a three-digit alphanumeric code; e.g., N7B. The first digit represents a functional group while the last

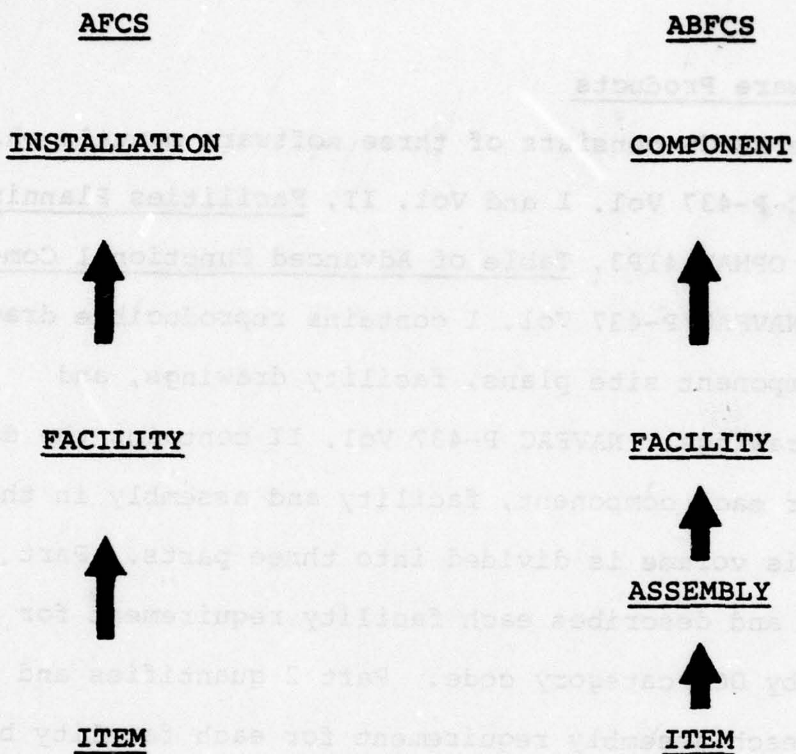

Fig. 2-2. Comparison of Hierarchial Levels Between the AFCS and the ABFCS

two digits function as a sequence designator. In this instance N7B identifies a camp for 1000 men complete with housing and other camp facilities (17:I-84; 4:72,73; 19: 190,485).

ABFCS Software Products

The ABFCS consists of three software manuals which are: NAVFAC P-437 Vol. I and Vol. II, Facilities Planning Guide; and OPNAV 41P3, Table of Advanced Functional Components. NAVFAC P-437 Vol. I contains reproducible drawings of component site plans, facility drawings, and assembly drawings. NAVFAC P-437 Vol. II contains the data display for each component, facility and assembly in the ABFCS. This volume is divided into three parts. Part I quantifies and describes each facility requirement for each component by DOD category code. Part 2 quantifies and describes each assembly requirement for each facility by assembly number. Part 3 quantifies each assembly in terms of item requirements by NSNs. Other information that is useful for planning purposes such as crew size, man hours by skill, land area required, etc. are also contained in Volume II. OPNAV 41P3 provides the basic document on the ABFCS for use by fleet commanders in the planning and establishment of advanced bases to support operating forces in the theatre of operations. This manual also provides a summary listing of all the components contained in the ABFCS (17:v; 19:1,2).

The ABFCS also utilizes a computer processing capability to control and update the above manuals on a yearly basis. The ABFCS contains approximately 1000 facilities and 2200 assemblies (4:73,77).

CHAPTER III

METHODOLOGY

Introduction

The methodology of this research is a three-phased, manual process. Figures 3-1 and 3-2 are a simplified representation of this process. Phase I, Facility Components Systems Search, shown in Figure 3-1, is a process whereby the Army and Navy facility component systems are searched to determine if these systems have facilities that can satisfy identified Air Force facility requirements. Phase II, AFCS Simulation, shown in Figure 3-2, determines how long it will take for a facility or number of facilities to be delivered to any USAF base in Europe. Finally, Phase III, also shown in Figure 3-2, is the analysis of information from Phases I and II and conclusions.

Phase I--Facility Components Systems Search

Base Development Plan

Referring to Figure 3-1, the initial step in Phase I is identification of the Air Force facility requirements. Recall from Chapter I, the Base Dvelopment Plan (BDP) is the tool that identifies these facility requirements.

Phase I--Facility Components Systems Search

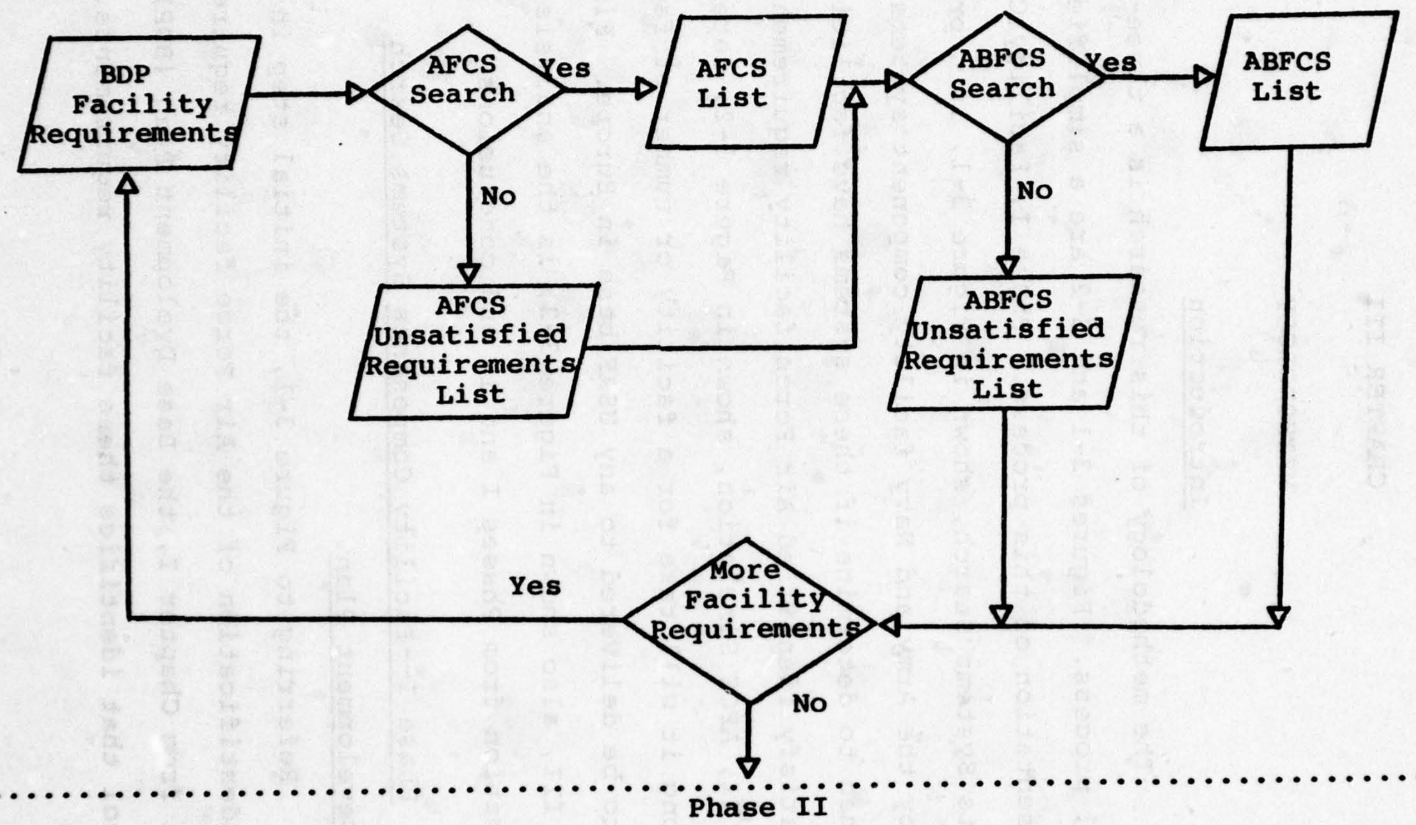

Fig. 3-1. Flowchart of Research Methodology--Phase I

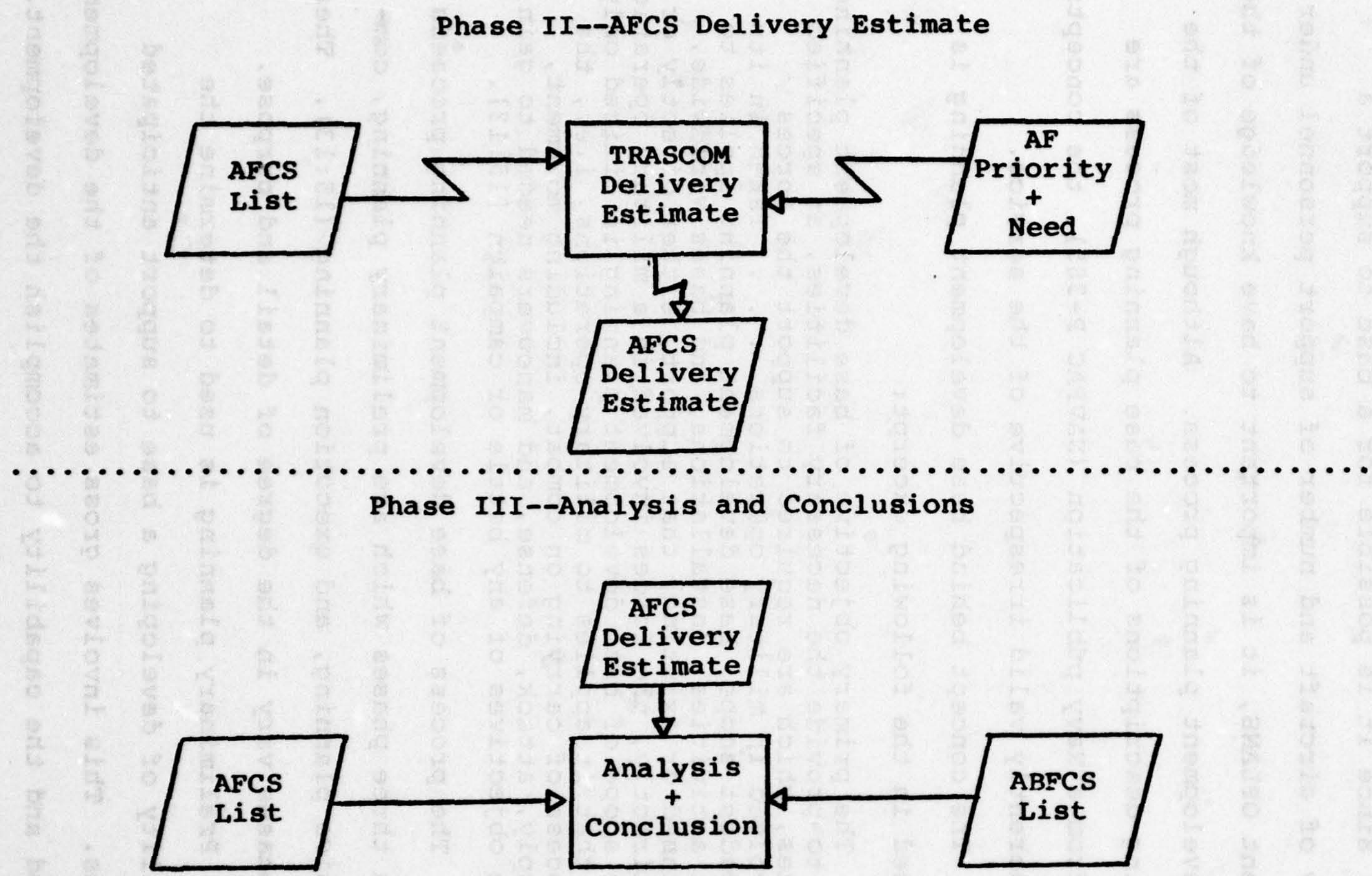

Fig. 3-2. Flowchart of Research Methodology--Phases II and III

Base Development Planning

Since it is possible for a base to support a variety of aircraft and number of support personnel under different OPLANS, it is important to have knowledge of the base development planning process. Although most of the following descriptions of the base planning process are taken from a Navy publication (NAVFAC P-385), the concepts are inherently valid irrespective of the service.

The concept behind base development planning is described in the following excerpt:

> The primary objective of base development planning is to provide the necessary facilities, at specified sites, which are required to support the forces involved in military operations. . . . Taken in its broadest scope, base development planning applies to all activities, installations, and bases worldwide, planned or existing, that support, either directly or indirectly, the forces involved in a military operation. The scope of base development planning is limited only in that it applies to military operations, i.e., the process of carrying on combat, including movement, supply, attack, defense, and maneuvers needed to gain the objectives of any battle or campaign [15:13].

The process of base development planning proceeds through three phases which are preliminary planning, comprehensive planning, and execution planning (15:13). These three phases vary in the degree of detail and purpose.

Preliminary planning is used to determine the feasibility of developing a base to support anticipated missions. This involves gross estimates of the development required and the capability to accomplish the development. In the NATO theatre, preliminary planning would concentrate

on the development of four types of airbases that are available to the Air Force for contingency operations:

1. Main Operating Base (MOB). This is an USAF operational base such as Ramstein AB, Germany.

2. Co-located Operating Base (COB). This base is an allied-owned base from which the USAF operates as a tenant.

3. Limited Base (LB). This base is in caretaker status.

4. Standby Base (SB). This base is an abandoned World War II airstrip.

Preliminary planning would also account for other factors such as:

1. Type and number of deployed aircraft that will augment the existing base.

2. Special Requirements. Special requirements are those created by a special mission or weapon system that may be used. Examples of these requirements are:

   a. Unique electrical power such as 400 volt power to drive generators or special equipment.

   b. Rigid environmental controls in hangars.

   c. Extra weapons maintenance facilities for unique or highly sophisticated weapon system.

3. Number of additional support personnel that will be stationed at the base.

4. Types of aircraft missions that will be flown.

5. Number of sorties (mission per aircraft) per day.

This information is useful for developing the details of the comprehensive plan (15:21-23;2).

The comprehensive planning phase analyzes the information aggregated during the preliminary planning phase and makes determinations as to:

1. What facilities are required
2. What facilities are available
3. Where new facilities are to be built
4. When new facilities must be ready to use
5. What type and size of construction force is required, and
6. What type and amount of construction material is required [15:25].

This information is then tabulated into a useable format. For the purposes of this research a summary listing of base requirements, assets, and deficiencies is satisfactory. Table 3-1 is typical of the BDP required for this research. According to AFCEC/DOS, this BDP represents a typical BDP for the NATO theatre (22).

The execution planning phase merely specifies the methods of implementing the development plans set forth in the comprehensive planning phase (15:45).

The AFCS Search Process

The researchers could not find in the AFCS technical manuals and related informaton recommended methods

TABLE 3-1

SIMULATED BASE DEVELOPMENT PLAN:
BASE REQUIREMENTS, ASSETS, AND DEFICIENCIES

DOD Category Code	Description	Unit Meas.	Quantity Required	Quantity Assets	Quantity Deficient
111A	Runway-Fixed Wing	SY	150000.0	150000.0	0.
112A	Taxiway	SY	98323.0	98333.0	0.
113A	Acft Parking Apron	SY	330000.0	254000.0	76000.0
133A	Control Tower	SF	400.0	400.0	0.
141J	Helo Hngr Rescue	SF	9600.0	0.	9600.0
149A	Acft Revetment	LF	10080.0	0.	10080.0
211A	Maintenance Hangar	SF	27675.0	91919.0	0.
211D	Acft Organ Maint	SF	6000.0	5929.0	571.
214B	Auto Vehicle Shop	SF	173.0	13320.0	0.
219A	Maint on Air Fac	SF	146.0	0.	146.0
411F	Heating Fuel Storage	BL	49.0	0.	49.0
442A	Cov Stor, Sqdn/Unit	SF	56.0	88544.0	0.
610A	Administration Bld	SF	37.0	53878.0	0.
721A	Troop Hsg, Em	SF	3953.0	32468.0	0.
722A	Enl Men Dining Fac	SF	769.0	0.	769.0
722B	Comm Pers Dining	SF	23.0	5696.0	0.
724A	BOQ	SF	671.0	2160.0	0.
725A	Emerg Trp Msg	SF	2250.0	0.	2250.0
725B	Emerg Field Mess	SF	405.0	0.	405.0
711A	Electricity	KW	84.0	0.	84.0
812A	Electric Dist Line	LF	360.0	0.	360.0
841A	Water Source	KG	5.0	0.	5.0
841B	Water Treat Fac	KG	4.0	0.	4.0
841C	Water Storage Fac	GA	2600.0	0.	2600.0
842A	Water Dist Ln, Pota	LF	572.0	0.	572.0

of searching the technical manuals to identify the needed facilities. Consequently, the researchers formulated their own organized and methodic search process which is described in general terms below. The adoption of this search procedure is not meant to imply that other methods of searching may not be effective. In the absence of any guidance, however, this search procedure seemed to provide a reasonable and logical approach to the problem.

Figure 3-3 shows the approach used in the AFCS search process. As stated earlier, the BDP identifies Air Force facility requirements from contingency operations. Information taken from Air Force Manual (AFM) 86-2, Standard Facility Requirements, supplements the BDP facility information and further defines the specifics of the facility requirement in question. This information will be used to enter TM5-301 (by facility listing). This initial manual search could result in one of two possible outcomes for each BDP requirement. If the AFCS has an acceptable facility, the facility description and AFCS designator will be placed on the AFCS list. The other possible result of this initial search will be the identification of a number of facilities that could be acceptable if more information about the facilities was available. The solution to this problem is to check through TM5-303, Bill of Materials, to see if the information provided therein could further

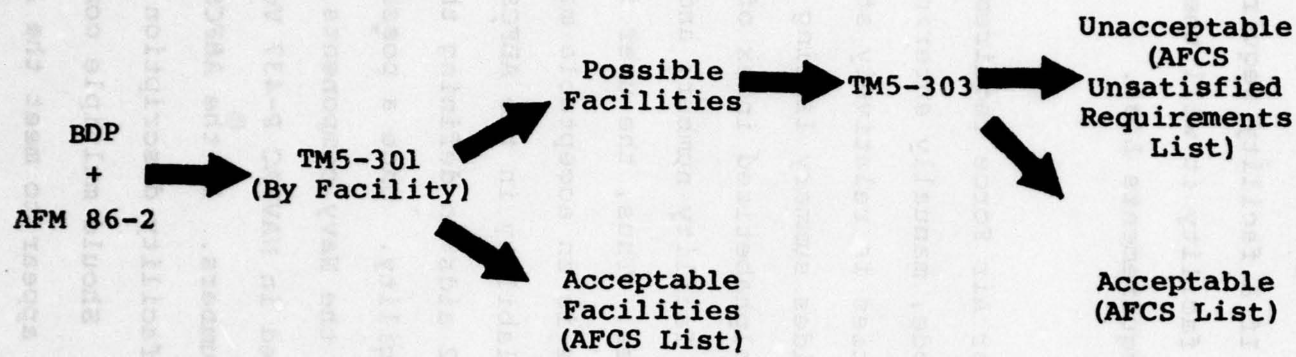

Fig. 3-3. AFCS Search Process

define the characteristics of the AFCS facilities in question.

As AFCS facilities are subsequently termed acceptable and matched to the BDP requirement they will be placed on the AFCS List. If a facility requirement can not be matched to an AFCS facility it will then be placed on the AFCS Unsatisfied Requirements List.

<u>The ABFCS Search Process</u>

Because the BDP for Air Force requirements is broken down by category code, manually entering the ABFCS to find acceptable facilities is relatively straightforward. NAVFAC P-437 Vol. II provides summary listing of components by sequential number; an alphabetized index of facilities; an index of facilities by facility number; and an alphabetized index of assemblies. Thus, the user is able to quickly ascertain if there is an acceptable match between his requirements and availability in the ABFCS. Of course, a quick review of AFM 86-2 aids in defining the requirements of the Air Force facility. Once a possible match is determined, details of the Navy components, facilities, and assemblies are provided in NAVFAC P-437 Vol. II by their respective coding numbers. If the ABFCS has an acceptable facility, the facility description and code are placed on the ABFCS list. Should multiple components, facilities, or assemblies appear to meet the Air Force

requirements, a detailed examination of the information within NAVFAC P-437 Vol. II and a perusal of NAVFAC P-437 Vol. I should resolve this situation. As acceptable facilities are determined, the description and code are placed on the ABFCS list. If a facility requirement cannot be matched against any or a combination of ABFCS assets, this facility is then placed on the ABFCS Unsatisfied Requirements List. Figure 3-4 illustrates the ABFCS search process.

Phase II--AFCS Simulation

Referring to Phase II in Figure 3-4, the time to deliver the facilities to an European Air Base is estimated. The Army Troop Support and Aviation Material Readiness Command (TRASCOM), AFCS office, DRSTS-STPM, is the Army organization responsible for the logistical coordination and delivery of the items. TRASCOM takes the information from the AFCS List created in Phase I, combines it with Air Force Unit urgency of need designators and Air Force unit priorities to determine the delivery times. Chapter V explains the process in detail.

Phase III--Analysis and Conclusion

Once the AFCS and ABFCS have been manually searched in Phase I and the delivery times have been estimated in Phase II, the results are compiled for analysis and conclusions.

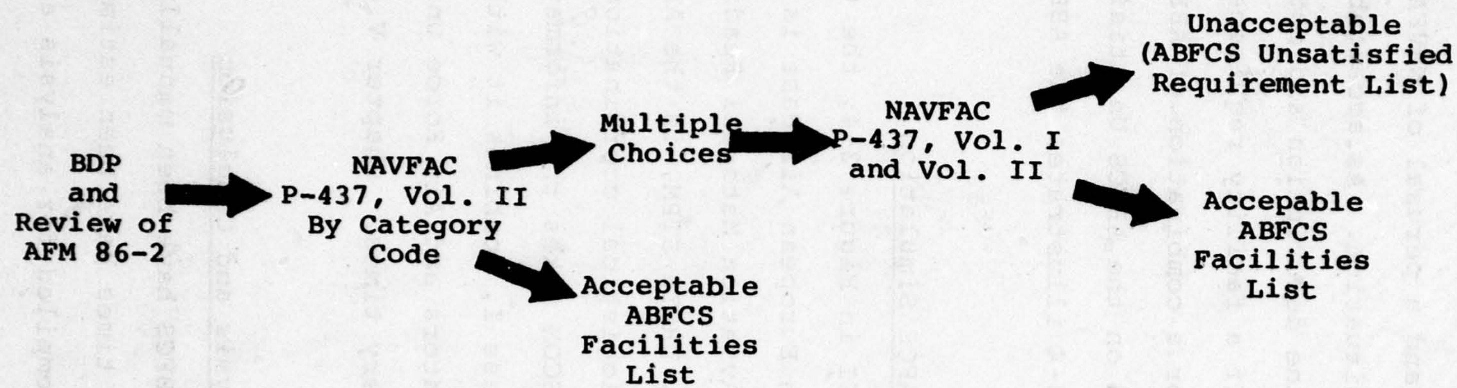

Fig. 3-4. ABFCS Search Process

CHAPTER IV

RESULTS OF THE FACILITY SEARCH IN THE AFCS AND ABFCS

Now that the search process has been explained in detail in Chapter III, this chapter will present the results of the search process. Recall that items being sought are those identified in the BDP with deficit quantities. For convenience, these items are summarized in Table 4-1.

In order to understand what the Air Force needs in these facilities to compare to what is available in the ABFCS and AFCS, it is appropriate to consult the facility descriptions contained in AFM 86-2, Standard Facility Requirements.

Descriptions of BDP Deficit Facility Requirements

The following passages provide the Air Force standard facility descriptions/requirements that were used as reference during the AFCS and ABFCS search process.

113A. Aircraft Parking Apron: Aprons are paved areas provided for aircraft parking, servicing and loading and may be of mass, strip, or dispersed stub design.[1]

[1]A mass apron refers to continuous, bounded paved area. A strip apron refers to a continuous length of paved area of a specified width. A dispersed stub apron refers to a paved aircraft alert area that is detacked from the main parking area.

TABLE 4-1

REQUIRED FACILITIES

Category Code	Facility Description	Unit of Measure[a]	Quantity Deficient
113A	Aircraft Parking Apron	SY	76000
141J	Helicopter Hangar, Rescue	SF	9600
149A	Aircraft Revetment	LF	10080
211D	Aircraft Organizational Maintenance	SF	571
219A	Maintenance, PW Air Facility	SF	146
411F	Heating, Fuel Storage	BL	49
722A	Enlisted Men's Dining Facility	SF	769
725A	Emergency Troop Housing	SF	2250
725B	Emergency Field Mess	SF	405
811A	Electricity	KW	84
812A	Electric Distribution Line	LF	360
841A	Water Source	KG	5
841B	Water Treatment Facility	KG	4
841C	Water Storage Facility	GA	2600
842	Water Distribution Line Potable	LF	572

[a]Consult "Definitions of Terms" in Chapter I for explanation of abbreviations.

There are no predetermined standards for apron sizes. Apron sizes are designed to support specific aircraft (fighter, transport, or bomber) configurations for individual bases. The apron dimensions are determined by the size, type, and number of aircraft requiring parking and maneuvering space, determined by the type of mission the aircraft performs. Other factors which determine apron requirements are physical characteristics of the project site and the landing gear configuration and loading of the parked aircraft (11:2-2,3-4).

141J. Helicopter Hangar, Rescue. This facility supports the activities of a rescue and recovery unit by providing hangar space for two helicopters and shop and personnel space to accomplish various support functions such as maintaining the helicopters and providing space for alert crews. Housing in a single structure along the flightline is desirable. Components of this facility include:

(a) Hangar space for the protection of two helicopters--one in alert status, the other under maintenance. It includes space for organizational activities and associated equipment.
(b) Space for unit command, training and administrative functions.
(c) Alert-crew lounge, sleeping quarters and locker room for assigned personnel equipment.
(d) Space for supply and tool storage and for aircraft maintenance control function and records [11:6-2].

149A. Aircraft Revetment. AFM 86-2 does not contain guidance on the requirements for this facility. Requirements were assumed to be sixteen-feet high steel bins.

211D. Organizational Maintenance Shop. This facility provides space for loose equipment and storage, tool kit storage, tool crib, bench type maintenance activities, administration and latrines and lockers. The amount of space required is determined from the type of aircraft and mission supported (11:8-4).

219A. Maintenance PW Air Facility. This facility is utilized by the Base Engineering organization to accomplish any of four functions: civil engineering management and administration; civil engineering operations, and civil engineering maintenance; and civil engineering minor construction. The facility is required to support shop maintenance activities that include carpentry, plumbing and heating, refrigeration, electrical, sheet metal, welding and painting. Space for storage of bench stock and tools is provided in each functional shop as required (11:8-16, 8-17).

411F. Heating Fuel Storage. This facility is an above-ground cylindrical tank for small operating tanks (under 25000 gallons) and can be used to store all types of products (11:9-1).

722A. Enlisted Men's Dining Facility. This dining facility contains the following elements:

(a) Refrigerated and dry storage space. That space in which food and other pertinent materials are stored prior to being processed or used.
(b) Food preparation and support space. That area of the kitchen proper in which preparation is accomplished. It also includes utensil wash, lockers, toilets, office, garbage and trash, and janitor closet.
(c) Dining room space. That space in which food is served and consumed. It includes seating areas, aisles, serving counters and lines, and dish-washing room [11:15-1].

Dining facility requirements are determined by the number of people serviced and the turnover rate for meal periods (11:15-1).

725A. Emergency Troop Housing. AFM 86-2 does not contain guidance on the requirements for this facility. Requirements were assumed to be general purpose facility complete with heating, plumbing and electricity.

725B. Emergency Field Mess. AFM 86-2 does not contain guidance on the requirements for this facility. Requirements were assumed to be similar to those specified for 722A, Enlisted Men's Dining Facility.

811A. Electricity. This facility provides generation of prime or standby electric power in cases where commercial power is unavailable or inadequate to meet the operational requirements of the base. The facility includes generators, prime movers, fuel storage and supply, switch

gear transformation if required, and complete building space required (11:19-1).

812A. Electric Distribution Line. This facility distributes electrical energy around the base by either primary or secondary lines. Primary distribution system includes poles, guys, cross arms, insulators, hardware, transformers, lighting arrestors, fuses, line switches and associated equipment. Secondary distribution system distributes energy for lights, motors and other appliances.

841A. Water Source. AFM 86-2 does not contain guidance on the requirements for this facility. Requirements were assumed to be for installing a well.

841B. Water Treatment Facility. AFM 86-2 does not contain guidance on the requirements for this facility. Requirements were assumed to be for clarification, color reduction, bacteria removal and sterilization of the water source.

841C. Water Storage Facility. AFM 86-2 does not contain guidance on the requirements for this facility. Requirements were assumed to be for a minimum storage of 5000 gallons of water.

842. Water Distribution Line, Potable. AFM 86-2 does not contain guidance on the requirements for this facility. Requirements were assumed to be four- to six-inch steel or plastic distribution mains and three-fourths to one-inch service laterals.

AFCS Results

The results of searching the AFCS for acceptable facilities that could be used to satisfy Air Force requirements generated by a BDP are presented in Table 4-2. The AFCS provided acceptable facilities in all cases except for aircraft revetments. Therefore, this facility was listed in the "AFCS Unsatisfied Requirements List" presented as Table 4-3.

ABFCS Results

The results of searching the ABFCS for acceptable facilities that could be used to satisfy Air Force requirements generated by a BDP are presented in Table 4-4. The ABFCS provides acceptable facilities or assemblies to meet all Air Force requirements.

TABLE 4-2

AFCS LIST

BDP Required Facility	DOD Category Code	Quantity Required	AFCS Facility Title	AFCS Facility Designator	Quantity Required
Aircraft Parking Apron	113A	76000 SY	5" Hot Mix Bituminous Concrete Apron, Hard-stand	853744	76
Helicopter Hangar, Rescue	141J	9600 SF	Automotive Ordnance Rebuild Shop	214311	1
Organizational Maintenance Shop	211D	571 SF	Steel Frame, Motor Repair Shop	214111	1
Maintenance PW Air Facility (BCE Facility)	219A	146 SF	Wood Frame Warehouse Type Construction	340413	1
Heating Fuel Source	411F	49 Barrels	POL Tank, 100 Barrel	123401	1
Enlisted Men Dining Facility	722A	769 SF	Steel Frame Kitchen and Mess Hall	726122	1
Emergency Troop Housing	725A	2250 SF	Steel Frame Barracks	722115	2
Field Mess	725B	405 SF	REQUIREMENT IS SATISFIED BY ENLISTED MEN DINING FACILITY--AFCS 726122		
Electricity	811A	84 KW	100 KW Generating Plant	811105	1

TABLE 4-2--Continued

BDP Required Facility	DOD Category Code	Quantity Required	AFCS Facility Title	AFCS Facility Designator	Quantity Required
Electric Distribution Line	812A	360 LF	Electrical Distribution Line, Primary	812102	1
Water Source	841A	5000 Gal	Deep Water Well w/6000 Gal Storage Tank	842101	1
Water Treatment	841B	4000 Gal	Chemical Storage and Erolator Steel Frame Building	841712	1
Water Storage	841C	2600 Gal	REQUIREMENT IS SATISFIED BY DEEP WELL WATER SOURCE--AFCS 842101		
Water Distribution Line	842A	572 LF	Water Supply Pipeline, Small	842004	1

TABLE 4-3

AFCS UNSATISFIED REQUIREMENTS LIST

BDP Required Facility	DOD Category Code	Quantity
Aircraft Revetment	149A	10,800 LF

TABLE 4-4

ABFCS LIST

BDP Required Facility	DOD Category Code	Quantity Required	ABFCS Facility Title	ABFCS Facility Designator	Quantity Required
Aircraft Parking Apron	113A	76000 SY	Aircraft Parking Apron Steel (M8A1)	11320A	64
Helicopter Hangar, Rescue	141J	9600 SF	Hangar E Module	21105A	1
Aircraft Revetment	149A	10080 LF	Aircraft Revetment	14910B	27
Aircraft Organizational Maintenance	211D	571 SF	Aircraft Overhaul Repair Shop 36x60, panelized Building	21170A	1
Maintenance PW Air Facility	219A	146 SF	Public Workshop 20x48 RF Building Compressor, Air 15 CFM	21910C	1
Heating Fuel Source	411F	49 BL	Tank Fuel Oil Storage, 25 BBL	42006	2
Enlisted Men Dining Facility	722A	769 SF	Galley-Mess, 100 Man	72210PB	1
Emergency Troop Housing	725A	2250 SF	Troop Housing Emergency with Shower, Washroom	72510T	3
Field Mess	725B	4055 SF	Galley-Mess Field 250, Man Tents	72210AC	1

TABLE 4-4--Continued

BDP Required Facility	DOD Category Code	Quantity Required	Facility Title	ABFCS Facility Designator	Quantity Required
Electricity	811A	84 KW	Electric Power Plant, Diesel 3-30 KW Generators	81110AG	1
Electric Distribution Line	812A	360 LF	Pole Line 2 AWG 120/280V 3PH 4W 600LF	81230A	1
Water Source	841A	5000 Gal	Well Water Supply System, 16000 GPD	84150B	1
Water Treatment	841A	4000 Gal	Water Treatment Facility 12000 GPD	84110A	1
Water Storage	841C	2600 Gal	Water Storage Potable, 12000 Gal	84140F	1
Water Distribution Line	842A	572 LF	Water Distribution Line, Potable, 300 Ft, 1 in PVC Water Distribution Line, Potable, 300 Ft, 6 in Steel	84210CH	1

CHAPTER V

AFCS SIMULATION

Recall that one of the objectives of this research established in Chapter I was to determine the length of time it could take for the delivery of required facilities to an air base in an European location. While Chapter IV identified the required facilities that could be satisfied by the AFCS, this chapter will now provide information about the delivery and the time of delivery of these required facilities.

The selection of facilities relied upon the AFCS solely as an "engineering system," utilizing the information contained with TM5-301 and TM5-302. After the selection process, however, the AFCS must now respond as a "logistical system" for the acquisition and shipment of the selected facilities to the user. Fortunately, the AFCS integrates the "engineering system" with the "logistical system" to handle facility requests.

The AFCS Logistical System

The U.S. Army has realized the criticality of supporting users of the AFCS by ensuring that the AFCS is not solely an engineer's system. Army Regulation (AR) 415-16 states that a major objective of the AFCS is to "provide for

complete and responsive logistic support of the system [AFCS] [12:2]." The same regulation requires the Army Materiel Command (AMC) to ". . . accomplish or oversee the procurement, distribution, storage, assembly, and shipment of construction materials in support of AFCS requirements or requests [12:2]." This requirement in AR 415-16 is noteworthy because it provides for a supply and logistics infrastructure to be incorporated in the AFCS.

AMC delegated its AFCS responsibilities to the Troop Support and Aviation Material Readiness Command (TRASCOM). TRASCOM integrates the engineering and logistic system by functioning as the central point for all requests for AFCS support. They use TM5-303 to break out the bill of materials for facilities components contained in TM5-301 and TM5-302 to enter their logistical structure.

AFCS Operation

Figure 5-1 represents a simplified version of the operation of the AFCS. A requirement for facility support is identified by a base and forwarded to the theater of operations (TO) headquarters for coordination and approval. As explained in Chapter II, TM5-301 is a major input into this planning process. The requirement is normally transmitted to TRASCOM by the military message network. TRASCOM utilizes TM5-303 and computer programming to translate the requirement for facility support into specific items,

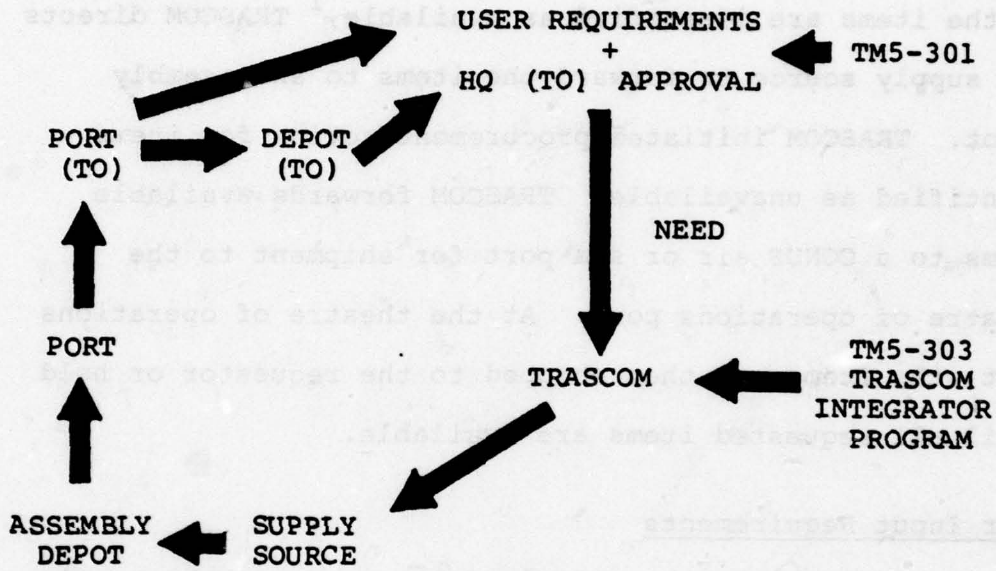

Fig. 5-1. AFCS Operation (6:21)

quantities required, and sources of supply. The supply sources for the items--U.S. Army Depots, the Defense Logistics Agency, the General Services Administration and National Inventory Control Points--are queried by the computer program to determine item availability status. If the items are identified as available,[1] TRASCOM directs the supply source to forward the items to an assembly depot. TRASCOM initiates procurement action for items identified as unavailable. TRASCOM forwards available items to a CONUS air or sea port for shipment to the theatre of operations port. At the theatre of operations port, the items are then shipped to the requestor or held until all requested items are available.

<u>User Input Requirements</u>

To initiate the AFCS logistics system, the user's requisition must provide four pieces of information to TRASCOM. First, the requisition must provide the required facilities either by facility number or installation number. Second, the requisition must provide funding information to insure reimbursement by the proper DOD agency for AFCS support. Third, the requisition must specify the place for delivery. The user can request delivery to a CONUS air or sea port, an overseas port, theatre of operations port, or a

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[1]Available may be thought of as on hand; conversely, unavailable is not on hand.

specific base. Since the U.S. Army has management responsibilities for delivery, they will deliver the facilities to the user's desired location (7). Lastly, the requisition must provide the requestor's priority designator (PD).

The priority designator is defined by the Department of Defense's Uniform Material Movement and Issue Priority System (UMMIPS). The PD consists of two factors--Urgency of Need (UND) and Force Activity Designator (FAD).

> The UND is an indicator of the urgency of the material requirement and how it affects the unit's mission. An "A" priority is the most urgent requirement. The only legitimate use of UND-"A" is the satisfaction of material requests needed for immediate end use to correct a situation that may preclude the accomplishment of the assigned operational mission . . . . UND-"B" indicates an immediate material requirement, the lack of which is impairing capability . . . . UND-"C" indicates a degree of priority not covered by UND-"A" or "B" [9:244-245].

The FAD is an assessment of the requesting organization's position relative to the spectrum of total military mission importance. The Secretary of Defense, in conjunction with the Joint Chiefs of Staff, establishes the FADs. The individual services are tasked with assigning the lower priority FADs. Table 5-1 shows the five FADs, assignment of authority, and the USAF precedence ranking system used for USAF units. For example, a USAF-assigned precedence of 3-10 is a FAD II.

TABLE 5-1

USAF ASSIGNED FADs (9:262)

Precedence	FAD	Assignment Authority
1-1 thru 1-20	I	SOD-JCS
2-1 thru 7-20	II	HQ USAF
8-1 thru 13-20	III	HQ USAF
14-1 thru 19-20	IV	HQ USAF
20-1 thru 25-20	V	HQ USAF

The UND and FAD combine to create the PD. Table 5-2 shows the FAD/UND/PD relationship. If a unit has a FAD II and an UND "A", its PD would be 2.

TABLE 5-2

UMMIPS PRIORITY DESIGNATORS (9:262)

FAD \ UND	A	B	C
	Priority Designators		
I	1	4	11
II	2	5	12
III	3	6	13
IV	7	9	14
V	8	10	15

The PD governs the order processing, supply processing and requisitioning, material selection, and selection of the mode of transportation. PDs of 1-3 are the highest priority and receive the speediest service. PDs 4-8 are secondary in service and PDs 9-15 are last.

Initiating the AFCS Simulation

On 7 July 1978 the initiation of the AFCS simulation -- Phase II of the methodology from Chapter III--began with a dispatch of a letter requisition to TRASCOM (Appendix). The requisition provides the necessary four pieces of information. First, the request contained the list of selected AFCS facilities developed in Chapter IV. Facilities were identified by the AFCS facility numbers. Secondly, the request asked TRASCOM to assume that acceptable funding information was previously provided. Third, the request specified delivery to a major U.S. air base in NATO. However, an actual base was not named to avoid compromise of classified war plans. Finally, the priority designator (PD) for the request was "2." The PD was developed using Tables 5-1 and 5-2. AFCEC/DOS provided a unit precedence of 3-10 which determines a FAD II (5). From Table 5-2, a FAD II and a UND of "A" provides a PD of 2.

Results of the AFCS Simulation

In various telephone conversations with the authors, TRASCOM stated that an AFCS request had never been accomplished (6). They estimated that the simulation would require two or three weeks to break the facility listing into a bill of materials, and then encode the bill of materials for the computer query of the supply sources (6). However, at the end of the fourth week, the simulation was

terminated by mutual agreement between the authors and TRASCOM so that the results could be presented in this research.

Simulation Results

Item Availability. Recall from Chapter II that the AFCS organizes data into three hierarchial levels. Items combine to make facilities and facilities combine to make installations.

In their response, TRASCOM provided a computerized listing of the required items for each requested facility. Each item was identified as either available or unavailable from the supply sources discussed earlier in this chapter. Available items were further differentiated as either readily available for delivery or available contingent upon procurement lead time (PLT). PLT ranged from one to twelve months. According to TRASCOM, items identified as unavailable were not really unavailable, but had somehow been "overlooked" by the computer query (6). They believed this phenomenon resulted from improper coding of item data for the computer query that prevented the return and collection of item status cards from the supply sources (6). TRASCOM attributed the coding errors to their inexperience in executing the computer query (6). They were confident, however, that future exercises would resolve the

coding problem and, thus, provide a current status for all items (6).

A summary of the AFCS simulation results is in Table 5-3. The table lists the number of items required for each requested facility (without consideration of quantities), the number of readily available items, the number of available items requiring PLT, and the number of items identified as unavailable. These results do not consider lumber and aggregate which would be purchased from "in country" sources.

As shown in the table, there was a total of 682 items required of which 396 were available, 56 require PLT, and 230 were not available. The only facility that had all required items listed as available was #842004. There were four facilities, #853744, 340413, 123401, 842101, with one or two items not available. These items are:

853744--all purpose asphalt for paving
MC-30 Asphalt

340413--Portland cement; roofing felt

123401--4,200 gallon metal storage tank

842101--Centrifuge pump; foot valve

These items are so critical to the function of each facility that because of their unsatisfactory availability status the facilities cannot be constructed or used.

TABLE 5-3

AFCS SIMULATION RESULTS

Facility	AFCS #	# Items Required	# Items Available	# Items Requiring PLT	# Items Not Available
Bituminous Apron/ Hardstand	853744	2	0	0	2
Automotive Shop	214311	93	60	4	29
Motor Repair Shop	214111	26	13	1	12
Warehouse	340413	12	9	1	2
POL Tank	123401	17	15	1	1
Kitchen and Mess Hall	726122	264	137	30	97
Barracks	722115	25	14	0	11
Electrical Generating Plant	811105	47	17	6	24
Electrical Distribution Line	812102	32	25	1	6

TABLE 5-3--Continued

Facility	AFCS #	# Items Required	# Items Available	# Items Requiring PLT	# Items Not Available
Deep Water Well	842101	22	18	2	2
Erdalator Building	841712	125	74	7	44
Water Supply Pipeline	842004	17	14	3	0
		$\Sigma = 682$	$\Sigma = 396$	$\Sigma = 56$	$\Sigma = 230$
			(58.1%)	(8.2%)	(33.7%)

Item Delivery. According to TRASCOM, available items could be ordered and assembled for shipment at a CONUS port within ten days (10:2). Overseas shipment to a NATO base such as Zweibucken would require twenty days. Total elapsed time, therefore, from order to delivery to a NATO base was thirty days (10:2).

CHAPTER VI

ANALYSIS AND CONCLUSIONS

Introduction

As presented in Chapter III the final phase of the research methodology is analysis of the results and concluding remarks.

Before embarking on the analysis of results, however, the authors wish to provide a few tempering remarks. The authors undertook this research with little expertise in the area of contingency planning and accomplished it while in the isolation of an academic environment. These factors created several problems. First, expertise in contingency planning is developed over time with exposure to policy, guidelines and regulations. It is also developed from contacts with other contingency planners, headquarters personnel, and a familiarization with the planning environment. Secondly, an academic environment does not impart a sense of urgency or a purposeful direction that shrouds a full-time contingency planner. Additionally, an academic environment cannot provide environmental considerations nor all the planning documents available to the real world contingency planner. For example, a single base development plan cannot provide complete information in defining Air Force

requirements at an actual base. A contingency planner at a base can physically identify requirements and compare these requirements to what is available from an existing facility component system. Lastly, working with totally unclassified information may not be completely reliable. These disclaimers are not meant to detract from the importance of this research effort, but merely highlight that perhaps more information is available to a professional contingency planner. The authors feel that these environmental factors are important realizations that must be kept in mind by a reader as he reviews the final portions of this effort.

Analysis of Results

In analyzing the results it is essential to recall the research objectives established in Chapter I. First and foremost, the authors attempted to formulate a valid methodology to identify and compare Air Force facility requirements with the AFCS and ABFCS. This had two distinct components. First, the facility requirements for the Air Force had to be identified. Secondly, two separate search processes for the AFCS and ABFCS had to be developed and tested. In doing this, a second objective--analyzing the acceptability of the two facility component systems with the Air Force requirements--was also addressed.

Finally, in simulating the AFCS requisition and delivery process, the final objective--that of determining the amount of time for delivery of facilities to NATO--was addressed. The remaining portion of this chapter will address the analysis of results in view of these objectives.

Validation of the Methodology

The methodology presented in Chapter III provided a logical approach to manually compare Air Force requirements against existing facility component system assets. This was possible because requirements are identified in base development plans to support a specific mission. Base development plans are common to all three services. They specify the facility requirements to build a new base, expand or alter an existing base, or provide maintenance to existing facilities. This information is then used to enter the AFCS or ABFCS to select facility components to meet the base development plan requirements. The AFCS and the ABFCS are structured to permit entry at different levels of information detail. A user may select facility components to build an entire base, a single facility, or repair any part of a facility.

The methodology used in this research was developed by the authors so they could objectively study the contents of the AFCS and ABFCS and compare needed facilities with available facilities. This task was made easier because of

the broad definitions of Air Force facility requirements found in the BDP. Nonetheless, the methodology was successful in accomplishing the research objectives because it provided a tool by which the researchers could view the two facility component systems and decide what was and was not available and acceptable.

The success of the methodology does not imply that it could be used as is by a contingency planner in the field whose objectives are quite different from those of the authors. In his situation he is tasked to find and acquire the needed facilities. He is not allowed the luxury to list facilities that cannot be satisfied by the systems. Acknowledging this limitation, though, the researchers feel the methodology satisfied the requirements of the research objectives and was a useful tool that, with careful modification, could be used by others in this field.

Acceptability of Existing Facility Component Systems

The results of Chapter IV indicate that in most cases the AFCS and ABFCS could provide facility components to satisfy the Air Force facility requirements provided in a base development plan for the NATO theatre. In some cases, there was not a direct correspondence between Air Force requirements and facility components; however, substitutable facility components were available to meet the

Air Force requirement. For example, one Air Force requirement was for a forty-nine-barrel heating fuel storage tank. Neither the AFCS nor the ABFCS provided this specific item, but both provided a range of heating fuel storage tanks in various capacities that could satisfy this requirement.

From Chapter IV, the ABFCS appeared to satisfy Air Force requirements better than the AFCS. The major reason for this is found in the nature of the Army and Navy missions and the philosophy used to provide that support. This will be discussed in the conclusions.

Facility Delivery

The results of the AFCS simulation indicate that, if all the items for a requested facility were available, delivery of the facility to a NATO base could be within thirty days. However, the delivery time is contingent upon the availability status of the facility items and the processing time of the requisition.

Only one of twelve requested facilities had all items available after four weeks of processing. The remaining eleven facilities lacked a number of critical items which rendered these facilities unuseable.

Even though percentages are not an adequate measure of item availability, they do indicate a trend. In the simiation, over 33 percent of the required facility items were not available. As mentioned in Chapter V,

TRASCOM is confident that this large number of unavailable items was created by improper data entry and can be easily solved in the future.

Conclusions

Both the AFCS and the ABFCS are ". . . military construction support systems for commanders and planners to use in selecting facilities for use in the theatre of operations [12:1]." The facility component systems represent

> . . . the quantitative expression and measurement of planning, procurement, assembly, and shipping of material and personnel needed to satisfy emergency facility support requirements overseas [17:4].

Each of the existing facility component systems is tailored to meet the anticipated facility requirements of their respective services. Each system is basically comprised of planning guidance, designs, bills of material, and logistic data that describes pre-engineered facilities commonly required by military forces for base development in the theatre of operations.

However, there are differences in service requirements and philosophy that influence the degree of usefulness of the AFCS and ABFCS to Air Force contingency planning. First, there is little commonality between the AFCS and the ABFCS past the item level. Thus, it is virtually impossible for the uninitiated to perform cross-checks between the two systems to pick out specific requirements. Secondly, each

system utilizes a different terminology to describe and identify its respective assets. For example, even when facilities are almost identical between the two systems, the terminology describing the facilities is somewhat varied. Table 6-1 illustrates this phenomenon. These differences are confusing to the contingency planner. A third difference is the ease of comparing Air Force requirements to the assets of the AFCS and ABFCS. The ABFCS was easier to use because the assets are identified by three different methods--components, facilities by DOD category code, and facilities by item requirements. The AFCS, on the other hand, identifies their assets only by AFCS installation number or AFCS facility designation.

TABLE 6-1 (4:74)

DIFFERENT TERMINOLOGY FOR SIMILAR FACILITIES

AFCS Facility	ABFCS Facility
Water Distribution	Std. Water Stg Tank Water Distribution Line
Drainage	Sanitary Sewer
Electric Distribution	Electric Distribution Line
Barracks, 50 Man	BEQ Without Mess
Bathhouse and Latrine	Shower Head
Kitchen-Mess Hall	Galley Mess

A fourth difference is the capability of the two systems to satisfy specific aircraft-related requirements. The Army, having less aircraft than the Air Force and Navy, has not oriented the AFCS to provide large stationary maintenance facilities needed to keep aircraft operational. The AFCS is geared toward supporting field troops and satisfying facility requirements in cantonment areas such as billeting, dining halls and small maintenance facilities. It could not directly satisfy facility requirements peculiar to aircraft requirements such as hangars, aprons, and revetments. However, the AFCS did provide minimum acceptable facility components that could be used for hangars and parking aprons. For example, the largest facility component suitable for hangar barely satisfied the aircraft dimensional requirements. The AFCS could not provide revetments.

The ABFCS, on the other hand, is familiar with aircraft requirements and provided acceptable facilities for every Air Force facility requirement specified in the base development plan. The ABFCS contains facility components for hangars, revetments and apron areas as well as facility components required for cantonment areas.

Finally, both the AFCS and the ABFCS are geared towards construction of new facilities rather than the alteration or repair of existing facilities. The inference drawn by the authors is that war damage will be repaired

using on-hand or in-country assets rather than using the AFCS or ABFCS to acquire the needed material.

The above comments reflect generalized remarks on the AFCS and the ABFCS. Specific remarks about each system are contained in the following sections.

AFCS

The AFCS does not provide a user's guide to search through the various technical manuals. Since the amount of information contained in these manuals is voluminous, a user's guide is essential. This comment was also voiced by a study done by the Army's Construction Engineering Research Laboratory (CERL). They recommended a manual

> . . . to provide information to aid users in understanding the system and the use of its products. . . . Emphasis [should be] on providing step-by-step guidance on the use of each product, including examples [4:163].

The researchers support the CERL's comment and feel that a user's guide would eliminate lost time and speed the facility selection process, especially for non-Army personnel who are not familiar with Army terminology, coding, and procedures.

The AFCS is geared to support the Army mission. This is not a profound statement. However, it is a finding made by the researchers in that the AFCS is proficient in supplying: (a) major troop support facilities such as housing, messing and recreation; (b) major medical

facilities; (c) major utilities and associated distribution network--POL, electrical, and water; and (d) marine ports for off and on load ships of cargo and fuel.

Army Regulation 415-16, the basic regulation of the AFCS, does not assess the Army's responsibility to support Air Force requirements for contingency construction overseas. Also, the AFCS information does not provide an explanation of how the Air Force should enter or use the AFCS.

During the entire research effort the authors encountered only one minor attempt to exercise the AFCS. It was done at a Pacific atoll, Enewetok, about two years ago. However, reports of the exercise as well as any information about it are limited. TRASCOM was not even aware that the exercise did occur (6). The fact that the entire AFCS operation, including TRASCOM, is not exercised regularly, prevents identification of flaws and bottlenecks that could cripple the system in wartime.

The impact of not exercising the AFCS is seen in the amount of time it took TRASCOM to simulate operation of the system. If the authors had not requested that the simulation be terminated at the end of four weeks, they are sure it would have continued much longer. As stated in Chapter V, the problem at TRASCOM appears to be a simple encoding error but four weeks is too long in a war to wait for replies from a management information system.

The solution to this problem is, simply, to exercise the AFCS. This will accomplish two things. First, it will allow TRASCOM to identify potential problems in their logistical network. Secondly, it will facilitate communication between AFCS and TRASCOM which seems to be lacking at this time.

ABFCS

As with the AFCS, the ABFCS does not provide a user's manual to explain the manuals and organization of the information in the ABFCS. However, use of the ABFCS is facilitated by organizing the information into three categories--components, facilities by category code, and facilities by items required. This enables an Air Force contingency planner ready access to ABFCS facility components to select required material to build new bases, facilities, or repair existing facilities.

The ABFCS is geared primarily to support Navy requirements but there is a great degree of commonality between Navy requirements and Air Force requirements. Aircraft hangars, revetments and other operational requirements are contained in the ABFCS.

APPENDIX

LETTER REQUISITION TO TRASCOM

7 July 1978

Commander, Troop Support & Aviation
Material Readiness Command
DRSTS-STPM
4300 Goodfellow Blvd.
St. Louis, Missouri 63120

Dear Mr. Feeler and Mrs. Marit,

Reference the 17 May 78, 5 Jul 78, and 6 Jul 78 telephone conversations with Captain Beally.

Enclosed is a listing of facilities identified from the AFCS that will satisfy Air Force requirements in a simulated contingency in Europe.

The unit precedence is 03-10 and the urgency of need (UND) is "A." These define a priority 2 requirement.

For our graduate research we require the amount of time it would take to deliver these facilities to a base in Europe. Delivery includes the ordering, order processing, procuring (including procurement lead time, if necessary), shipment to a CONUS port, delivery to an European port, and final delivery to the Air Force base of concern.

Since this research is a simulation for an European contingency, some assumptions must be made. Assume the following for this exercise:

1. Funding and MIPRs are not a problem. If necessary, assume the MIPRs have been sent to you.

2. The Air Force requests the Army deliver the facilities to the European Air Force Base.

3. Considering the classified nature of real war plans we do not have a name of a real Air Force base that would be used. Hence, assume the facilities will be delivered to a base in Europe that would take the longest time for a shipment to arrive ("worst case").

Our research is greatly dependent on this information. Consequently, we request and appreciate any expediting of this request. You can send your information to:

Captain Tim Beally
3054 Jewelstone Drive, Apt. J
Dayton, Ohio 45414

If you have any questions, feel free to call me at AUTOVON 785-6513. Leave a message and I will return your call. You can also call me at home (513) 890-4482.

I will be in touch with you. Thank you for your assistance.

Sincerely,

T. N. Beally, Captain, USAF
Graduate Student
Air Force Institute of Technology
School of Systems and Logistics

Enclosure: 1

AIR FORCE IDENTIFIED FACILITY REQUIREMENTS FROM THE AFCS

AFCS Facility Title and Number	Qty	AFCS Subfacilities Number	Qty
Hardstand, Apron, Hot Mix Bituminous, 853744	76	---	-
Shop, Ordnance, Automotive, 214311	1	214301	1.0
		340372	2.0
Shop, Motor Repair, Steel Frame, 21411	1	214101	1.0
		340373	1.6
Frame Roof & Foundation Wood Frame Warehouse, 340413	1	---	-
Tank, POL, 100-Barrel w/4-inch Pipe & Fittings, 123401	1	---	-
Kitchen & Mess Hall Steel Frame Bldg., 726122	1	340372	4.4
		340373	0.2
		340493	4.2
		340495	2.8
Barracks, Steel Frame Bldg., 722115	2	340371	4.0
		722105	2.0
Generating Plant, 100 KW, 811105	1	---	-
Electrical Distribution Line, Primary, 812102	1	---	-
Deep Water Well Supply w/Pump & Storage, 842101	1	---	-
Chemical Storage Erdlator, Steel Frame Bldg., 841712	1	340372	0.8
		841702	1.0
Water Supply Pipeline, Small, 842004	1	---	-

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AD-A060 977 AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHO--ETC F/G 15/5
AN ANALYSIS OF SIMULATED USAF FACILITY CONTINGENCY REQUIREMENTS--ETC(U)
SEP 78 T N BEALLY, R L GILBERT

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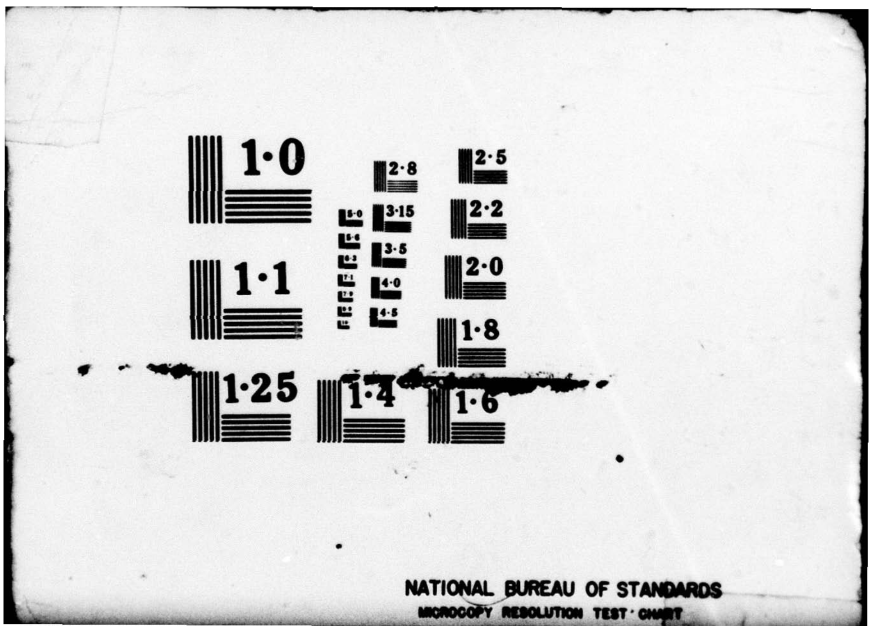
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